# HATCHERY EVALUATION REPORT

## Wells Hatchery - Summer Steelhead

**December 1996**

**Integrated Hatchery Operations Team (IHOT)**

# HATCHERY EVALUATION REPORT

## Wells Hatchery - Summer Steelhead

## An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures

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Section 1

# Executive Summary

This report presents the findings of the independent audit of the Wells Hatchery - Summer Steelhead program. Wells Hatchery is located along the Columbia River just below Wells Dam. The hatchery is used for adult collection, incubation, and rearing of summer chinook and summer steelhead.

The audit was conducted in 1996-1997 as part of a 2-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

## Background

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) "Strategy for Salmon" and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT). IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995)*. That document is the source for the performance measures that are the basis of this audit.

## The Audit Process

The audit was based on the facility management's response to a 109-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters.
- The hatchery manager was asked to fill out and return the audit form.
- A 1-2 day site audit visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans.
- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.
- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.

## Wells Hatchery - Summer Steelhead Results

The Wells facility includes one pond for adult holding, 12 concrete raceways, 3 rearing ponds, and incubation facilities. The hatchery is operated as a mitigation facility for fishery impacts caused by the Wells Dam.

The Wells Hatchery - Summer Steelhead program was in general compliance with many of the performance measures. In the area of program objectives, the hatchery did not have a monitoring and evaluation plan in place and needed to document many production performance goals. The audit found that the hatchery was not in compliance with the screen approach criteria, water quality monitoring requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery needs additional rearing space, acclimation ponds, and double screening of raceways. The hatchery needed to develop specific incubation early rearing, and rearing standards for the IHOT Operations Plan and a smoltification goal and monitoring plan. The hatchery was not in compliance with all of the transport and feed handling protocols. The hatchery also exceeded the flow and loading criteria for incubation and density criteria for rearing. The hatchery did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Wells Hatchery - Summer Steelhead program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Conduct IHOT QA/QC tests for feed preparation
- Construct 3 acclimation facilities
- Construct new pipeline; analysis needed to determine extent of modifications
- Develop alarm log
- Develop approved genetics M&E program
- Develop smoltification goal and monitor
- Develop specific incubation, early rearing, and rearing standards for the IHOT Operations Plan
- Develop training schedule for staff
- Develop written monitoring and evaluation plan for the IHOT Operations Plan
- Document adult contribution
- Document daily or weekly spawning activities
- Document DO and TGP levels
- Document eyed-egg to fry survival
- Document fry-to-smolt survival
- Document smolt production
- Document smolt-to-adult survival
- Document water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants
- Follow IHOT incubator criteria for loading and flow
- Follow IHOT protocols for disinfection of exteriors and interiors of transport vehicles
- Follow IHOT requirements for daily checking of water flow alarms and weekly checking of other alarms
- Follow IHOT requirements for reduction of oxygen concentrations to 8 ppm after system is functioning properly
- Follow IHOT temperature criteria for hauling

- Improve green-egg to eyed-egg survival
- Install auto dialer and pages
- Install double screens on 2 ponds
- Install intake screen that meets the current approach and mesh criteria
- Install predator control fencing around earthen ponds and evaluate
- Provide training on broodstock collection procedures
- Review IHOT requirement for disease-free water for rearing
- Review IHOT temperature criteria for rearing
- Review protocols for representativeness of male/female crosses

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 3, Section 4 of this report) were not listed above.

Section 2

# Facility Description

**Name:** Wells Fish Hatchery

**Stock/Species:** Summer Chinook
Summer Steelhead

**Operating Agency:** Washington Department of Fish and Wildlife

**Funding Agency:** Douglas County PUD

**Location:** Wells Hatchery is located along the Columbia River just below Wells Dam

**Address:** Washington Department of Fish and Wildlife
HC 88 Azwell RT, Box 2A
Pateros, WA 98846

**Hatchery Manager:** Mr. Gary Osborne

**Phone:** (509) 923-2741
**Fax:** (509) 923-2578

**Purpose:** The hatchery is operated as a mitigation facility for fishery impacts caused by the Wells Dam. The mitigation agreement with Douglas County PUD requires an annual production of 56,200 pounds of summer steelhead.

**Production Goal:**

**Summer Chinook**

Produce 320,000 yearling and 484,000 subyearling for on-station releases

Trap, hold, and spawn adult summer chinook for transfer of 1,300,000 green eggs to Eastbank Hatchery

Provide 2,000 eggs to co-op programs for educational purposes.

**Summer Steelhead**

Produce 450,000 smolts for on-station release

Produce eyed-eggs for transfer to Eastbank, Chelan, and Winthrop hatcheries

**Water Supply:** Average flows available to the hatchery are 78,000 gpm from the Columbia River and 9,000 gpm from the wells

## Facilities:

| | |
|---|---|
| Adult Holding: | 1 concrete adult holding pond - 18,300 cf |
| Incubation: | 46 16 stack vertical incubators (728 trays) |
| Early Rearing: | 42 shallow troughs - 7.2 cf each |
| Raceways: | 8 vinyl coated raceways - 2,700 cf each |
| | 4 concrete raceways - 2,250 cf each |
| Rearing Ponds: | 3 concrete rearing ponds, 30,400 cf, 30400 cf, and 25,000 cf |
| Satellite Facilities: | none |

Section 3

# Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in ***Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*** (referred to as *IHOT 1995* in this report).[1] The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audit included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 109-page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Two additional sections (sections 1 and 8) include general information and expenditure information needed for this Hatchery Evaluation Report and blank forms for additional comments. The following is the basic structure of the IHOT audit form:

| | |
|---|---|
| Section 1 | Performance Measures for General Information and Expenditure Information (PMs General 1-2) |
| Section 2 | Performance Measures for Program Objectives (PMs 1-4) |
| Section 3 | Performance Measures for Facility Requirements (PMs 5-15) |
| Section 4 | Performance Measures for Hatchery Practices (PMs 16-25) |
| Section 5 | Performance Measures for Fish Health Policy (PMs 26-34) |
| Section 6 | Performance Measures for Ecological Interactions (PMs 35-38) |
| Section 7 | Performance Measures for Genetics Policy (PMs 39-43) |
| Section 8 | Blank Forms for Additional Comments |

Several performance measures are repeated in various sections of the audit form. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by shaded text.

## The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process consisted of research and onsite visits. The site visit at the Wells Hatchery was conducted on October 28, 1996.

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[1]Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

The following is the five-step audit process:

1. Information was obtained from headquarters.

2. The hatchery manager was asked to fill out and return the **Audit Form**.

3. A 1-2 day site audit visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.

4. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative. A portion of the Hatchery Evaluation Report was sent to the hatchery manager following the audit visit as a **Compliance Report**. That Compliance Report is Table 2 of this report.

5. Information from steps 1-4 was used to prepare a draft **Hatchery Evaluation Report**. This draft report was submitted to the operating agencies for review of the information used to determine compliance. Based on review and comments, a final Hatchery Evaluation Report was developed. The final report documents the compliance of a particular hatchery with the IHOT performance measures and presents cost estimates to correct any deficiencies.

## Compliance Status of Wells Hatchery - Summer Steelhead

The following table includes information on life-stages that are held on this facility for some portion of their rearing cycle (Table 1). For multi-facility programs, summary cost and contribution data is presented at the facility where rearing occurs. For the compliance status relating to performance measures that do not occur at this hatchery, please refer to the Hatchery Evaluation Reports for the hatcheries and stocks listed in Table 1. A check mark (✔) indicates that the specific life-stage is held at this facility.

This section documents the compliance status of the Wells Hatchery - Summer Steelhead program. Each performance measure is presented in a table taken from the audit form (Table 2). The compliance status is identified by the following categories:

- **N/A** (not applicable)
- **Yes** (in compliance)
- **?** (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4 of this report, where the cost of the required remedial actions is also presented.

**Table 1 Summary Program Information for Wells Hatchery - Summer Steelhead**

| Component | Location of Adult Holding, Spawning, Incubation, and Rearing | | | | | |
|---|---|---|---|---|---|---|
| | Wells Hatchery | Area Rivers (a) | Eastbank Hatchery | Chelan Hatchery | Winthrop Hatchery | |
| Adult Collection | ✔ | | | | | |
| Adult Holding | ✔ | | | | | |
| Spawning | ✔ | | | | | |
| Fertilization | ✔ | | | | | |
| Incubation | | | | | | |
| green-to-eyed | ✔ | | eyed eggs transferred | eyed eggs transferred | eyed eggs transferred | |
| eyed-to-hatch | ✔ | | | | | |
| Rearing | | | | | | |
| fry | ✔ | | | | | |
| fingerlings | ✔ | | | | | |
| smolts | ✔ | | | | | |
| Acclimation/release | | ✔ | | | | |

(a) Released off-station in Okanogan, Methow, Twisp, Similkameen, and Chiwawa Rivers.

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **the hatchery programs outlined in a subbasin nagement plan?** | | ✔ | | | Columbia Basin System Planning Production Plan and Wells Mitigation (FERC Agreement) | |
| **ıe hatchery operating under a current hatchery rational plan?** | | ✔ | | | IHOT Operations Plan | |
| s it understood by staff? | | ✔ | | | | |
| s it being followed? | | ✔ | | | | |
| **hatchery monitoring and evaluation plan in place?** | | | | | | |
| Do you have a written monitoring and evaluation plan? | | | | ✔ | No information provided | Develop written monitoring and evaluation plan for the IHOT Operations Plan |
| **ılt contribution to fisheries, spawning grounds, and chery** | | | ✔ | | No data provided | Document adult contribution |
| **ılt pre-spawning survival as compared with blished goal** | | | | ✔ | Review of records; in complance 2 out of last 3 years. Not a problem recently. | None |
| **-take as compared with established hatchery goal** | | ✔ | | | Review of records; in compliance 3 out of last 3 years | |
| **en-egg to eyed-egg survival as compared with blished goal** | | | | ✔ | Review of records; in compliance 1 out of last 3 years | Improve green-egg to eyed-egg survival |
| **d-egg to fry survival as compared with established l** | | | ✔ | | No data provided | Document eyed-egg to fry survival |
| **to smolt survival as compared with established goal** | | | ✔ | | No data provided | Document fry-to-smolt survival |
| **duction as compared with established goal** | | | ✔ | | No data provided | Document smolt production |
| **cent survival (smolt to adult) as compared with blished goal** | | | ✔ | | No data provided | Document smolt-to-adult survival |
| **nber of eggs, fry, fingerlings, smolts, and/or adults neet basinwide needs** | ✔ | | | | Review of records/Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **nperature** | | | | | | |
| Does your water temperature meet the criteria for spawning? | | | | ✔ | Use well water; too warm. No real problems observed. | None |
| Does your water temperature meet the criteria for ncubation? | | ✔ | | | Review data | |
| Does your water temperature meet the criteria for earing? | | | ✔ | | Review data. Mix wells and surface water for temperature control. | Review IHOT temperature criteria for rearing. |
| **solved gases** | | | | | | |
| s the oxygen level near saturation? | | | ✔ | | No data provided | Document DO concentrations |
| s the dissolved nitrogen level less than saturation? | | | ✔ | | No data provided | Document TGP levels |
| **emistry** | | | | | | |
| mmonia (un-ionized) | | | ✔ | | No data provided | Run analysis |
| Carbon Dioxide | | | ✔ | | No data provided | Run analysis |
| Chlorine | | | ✔ | | No data provided | Run analysis |
| H | | | ✔ | | No data provided | Run analysis |
| Copper | | | ✔ | | No data provided | Run analysis |
| Hydrogen Sulfide | | | ✔ | | No data provided | Run analysis |
| ron | | | ✔ | | No data provided | Run analysis |
| inc | | | ✔ | | No data provided | Run analysis |
| **bidity** | | | | | | |
| Does your turbidity meet the criteria? | | | ✔ | | No data provided | Run analysis |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **alinity and hardness** | | | | | | |
| oes your alkalinity and hardness meet the criteria? | | | ✔ | | No data provided | Run analysis |
| **ite** | | | | | | |
| oes your nitrite meet the criteria? | | | ✔ | | No data provided | Run analysis |
| **ontaminants** | | | | | | |
| ldrin | | | ✔ | | | |
| ndrin | | | ✔ | | No data provided | Run analysis |
| ieldrin | | | ✔ | | No data provided | Run analysis |
| eptachlor | | | ✔ | | No data provided | Run analysis |
| hlordane | | | ✔ | | No data provided | Run analysis |
| ethoxychlor | | | ✔ | | No data provided | Run analysis |
| indane | | | ✔ | | No data provided | Run analysis |
| alathion | | | ✔ | | No data provided | Run analysis |
| uthion | | | ✔ | | No data provided | Run analysis |
| **hogens** | | | | | | |
| hat portions of the hatchery have disease-free water? | | | | | | |
| Adult holding | | ✔ | | | Inspection of facilities/Discussion | |
| Incubation | | ✔ | | | Inspection of facilities/Discussion | |
| Early rearing | | ✔ | | | Inspection of facilities/Discussion | |
| Rearing | | | | ✔ | Inspection of facilities/Discussion | Review IHOT requirements for disease-free water for rearing |
| Others | ✔ | | | | | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **rm Systems** | | | | | | |
| )o the following areas have alarms? | | | | | | |
| Intake | | ✔ | | | Inspection of facilities/Discussion | |
| Large rearing ponds and adult holding ponds | | ✔ | | | Inspection of facilities/Discussion | |
| Raceway headboxes and rearing ponds | | ✔ | | | Inspection of facilities/Discussion | |
| Incubation facilities | | ✔ | | | Inspection of facilities/Discussion | |
| Quarantine areas and facilities | ✔ | | | | None | |
| Water treatment systems | ✔ | | | | None | |
| Security | | ✔ | | | Have night watchman | |
| ıre there outside systems and buzzers in onsite esidences? | | ✔ | | | Discussion | |
| ıre water flow alarms checked daily? | | | | ✔ | Review of records/Discussion | Follow IHOT requirements for daily checking of water flow alarms |
| ıre all other alarms checked weekly? | | | | ✔ | Review of records/Discussion | Follow IHOT requirements for weekly checking of all other alarms |
| s there a log of alarms for emergencies, tests, and ıaintenance requirements? | | | | ✔ | Review of records/Discussion | Develop alarm log |
| ıre telephone pagers used? | | | | ✔ | Discussion | Install auto dialer system and pagers |
| **ılt collection and holding facilities** | | | | | | |
| )o you meet the adult holding criteria? | | ✔ | | | Review of records/Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **ıbation facilities** | | | | | | |
| 'ype 1: Vertical tray<br>)o you have an adequate number of units for the verall program? | | ✔ | | | Inspection of facilities/Discussion | |
| 'ype 2: N/A<br>)o you have an adequate number of units for the verall program? | ✔ | | | | | |
| **ıring facilities** | | | | | | |
| 'ype 1: Pond 15 (25x200)<br>)o you have an adequate number of units for the verall program? | | ✔ | | | Inspection of facilities/Discussion | |
| 'ype 2: Raceways (10x90)<br>)o you have an adequate number of units for the verall program? | | ✔ | | | Inspection of facilities/Discussion | |
| 'ype 3: Pond 16 (25x250)<br>)o you have an adequate number of units for the verall program? | | ✔ | | | Inspection of facilities/Discussion | |
| 'ype 4: Pond 17 (20x190)<br>)o you have an adequate number of units for the verall program? | | ✔ | | | Inspection of facilities/Discussion | |
| **ɛening facilities** | | | | | | |
| )o you meet the approach velocity criteria? | | | | ✔ | Inspection of facilities/Discussion | Install intake screens that meet the current approach velocity criteria |
| ıre the fish screens regularly cleaned? | | ✔ | | | Inspection of facilities/Discussion | |
| )oes the screen mesh meet screen opening criteria? | | | | ✔ | Inspection of facilities/Discussion | Install intake screens that meet the current mesh criteria |
| ıre rearing containers double screened for fish that hould not be released to adjacent water? | | | | ✔ | Inspection of facilities/Discussion | Install double screens on ponds |
| **dator control facilities** | | | | | | |
| ıre your predation control facilities effective? | | | | ✔ | Inspection of facilities/Discussion | Install predator control fencing around ponds and evaluate |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **d storage facilities and quality control** | | | | | | |
| )oes the storage of dry/semi-moist/moist foods dry<12%; semi-moist 12-20%; moist >20% moisture) ollow food manufacturer's recommendations? | | ✔ | | | Inspection of facilities/Discussion | |
| )oes a regional quality control officer oversee roduction procedures and monitor: | | | | | | |
| Verification by feed manufacturer that ingredients meet specifications? | | | | ✔ | Discussion | Conduct IHOT QA/QC tests for feed preparation |
| Ensure feed does not contain unwanted drugs or other additives? | | | | ✔ | Discussion | See above |
| Analyze ingredients contained in the final food product to ensure that feed specifications have been met? | | | | ✔ | Discussion | See above |
| ıre the foods stored and handled according to the ollowing criteria? | | | | | | |
| Moist pellets should not exceed 10 °F at point of delivery. | | ✔ | | | Discussion | |
| Moist pellets should be removed from freezer just prior to feeding. | | ✔ | | | Discussion | |
| Do not leave buckets of feed or feed containers outside exposed to light or heat. | | ✔ | | | Discussion | |
| Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish. | | ✔ | | | Discussion | |
| Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above). | ✔ | | | | None used for this program | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **ease facilities** | | | | | | |
| )o the release facilities ensure that fish are not ubjected to adverse conditions? | | ✔ | | | Inspection of facilities/Discussion | |
| **lution abatement facilities** | | | | | | |
| )o the pollution abatement facilities meet all federal nd state regulations (or good engineering practice)? | | ✔ | | | Inspection of facilities/Discussion | |
| ıre pollution abatement facilities operated correctly? | | ✔ | | | Discussion | |
| **nsportation facilities** | | | | | | |
| ıre the transport systems adequate to meet IHOT erformance measures for transportation practices? | | ✔ | | | Inspection of facilities/Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **odstock selection practices** | | | | | | |
| s the donor selection process document attached? (PM 40a) | ✔ | | | | Existing program; does not apply | |
| Was the donor selection outline followed in selecting ne hatchery broodstock? (PM #40b-c) | ✔ | | | | Existing program; does not apply | |
| **wning practices** | | | | | | |
| Were the appropriate number of spawners, male/female atios, and fertilization protocols used? (PM #42c-g) | | ✔ | | | Review of records/Discussion | |
| **ıbation practices** | | | | | | |
| specific incubation standards listed in the hatchery rations plan? | | | | ✔ | Review of IHOT Operations Plan | Develop specific incubation standards for IHOT Operations Plan |
| incubation practices written? | | | | ✔ | None supplied to inspection team | See above |
| ıbation Type 1: Vertical Tray (see PM #8) you meet the loading and flow criteria? | | | | ✔ | Review of records/Discussion | Follow IHOT criteria for loading and flow criteria |
| ıbation Type 2: (see PM #8) you meet the loading and flow criteria? | ✔ | | | | | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **ring practices** | | | | | | |
| specific rearing standards listed in the hatchery rations plan? | | | | ✔ | Review of IHOT Hatchery Operations Plan | Develop specific rearing standards for IHOT Operations Plan |
| rearing practices written? | | | | ✔ | See above | See Above |
| earing Unit Type 1: Shallow Troughs see PM #9) | | | | | | |
| Do you meet the density and DI criteria? | | | | ✔ | Review of records/Discussion | Develop specific early rearing standards for IHOT Operation Plan |
| Do you meet the Loading and FI criteria? | | | | ✔ | Review of records/Discussion | See above |
| earing Unit Type 2: Raceways 1-10 see PM #9) | | | | | | |
| Do you meet the density and DI criteria? | | | | ✔ | Review of records/Discussion | Construct additional raceways |
| Do you meet the Loading and FI criteria? | | | | ✔ | Review of records/Discussion | See above |
| earing Unit Type 3: Pond 16 (see PM #9) | | | | | | |
| Do you meet the density and DI criteria? | | ✔ | | | Review of records/Discussion | |
| Do you meet the Loading and FI criteria? | | | | ✔ | Review of records/Discussion | Construct new pipeline; analysis needed to determine extent of modifications |
| earing Unit Type 4: Pond 17 (see PM #9) | | | | | | |
| Do you meet the density and DI criteria? | | ✔ | | | Review of records/Discussion | |
| Do you meet the Loading and FI criteria? | | | | ✔ | Review of records/Discussion | Construct new pipeline; analysis needed to determine extent of modifications |
| **olt quality** | | | | | | |
| Do you produce a high quality smolt? | | ✔ | | | Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **h health management practices** | | | | | | |
| re the monthly hatchery monitoring visits being onducted? (PM #26) | | ✔ | | | Review of records/Discussion | |
| re the annual broodstock inspections being conducted? PM #27) | | ✔ | | | Review of records/Discussion | |
| there pathogen-free water (PM #5h)and are the anitation procedures being followed? (PM #28) | | ✔ | | | Review of records/Discussion | |
| re the following water quality parameters within riteria? (PM #5a-5g) | | | | | | |
| Water temperature | | | ✔ | | No data | See PM #5a |
| Dissolved gases | | | ✔ | | No data | See PM #5b |
| Chemistry | | | ✔ | | No data | See PM #5c |
| Turbidity | | | ✔ | | No data | See PM #5d |
| Alkalinity and hardness | | | ✔ | | No data | See PM #5e |
| Nitrite | | | ✔ | | No data | See PM #5f |
| Contaminants | | | ✔ | | No data | See PM #5g |
| re rearing standards being followed? (PM #19) | | | | ✔ | Review of records/Discussion | See PM #19 |
| re egg and fish transfer/release requirements met? PM #31) | | ✔ | | | Review of records/Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **s hatchery performance meet requirements lined in the regional hatchery policies and in basin and hatchery plans for the following areas?** | | | | | | |
| **cent smoltification** | | | | | | |
| Do you measure percent smoltification? | | | | ✔ | Discussion | Develop smoltification goal and monitor |
| Did you meet the smoltification criteria? | | | ✔ | | Discussion | See above |
| **ring density (prior to release)** | | | | | | |
| Did you meet the rearing density criteria just prior to elease? | | ✔ | | | Review of records/Discussion | |
| **ease condition (at release)** | | | | | | |
| Did you meet all disease regulations just prior to elease? | | ✔ | | | Review of records/Discussion | |
| **nber (at release)** | | | | | | |
| Did you meet the release number goal? | | | | ✔ | Review of records/Discussion | Improve predator control measures |
| **at release** | | | | | | |
| Did you meet the size goal? | | ✔ | | | Review of records/Discussion | |
| **es of release** | | | | | | |
| Did you meet the release date goal? | | ✔ | | | Review of records/Discussion | |
| **ation of release** | | | | | | |
| Did you release the fish at the specified location? | | ✔ | | | Review of records/Discussion | |
| **fish reared in the subbasin or acclimated in the basin?** | | | | | | |
| re the fish reared in the subbasin? | | | | ✔ | Discussion | Construct 3 acclimation facilities |
| re the fish acclimated in the subbasin? | | | | ✔ | Discussion | See above |
| **e release strategy appropriate for the program?** | | | | ✔ | Discussion | See PM #22b |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **nsportation facilities** | | | | | | |
| )o transportation equipment and personnel receive isinfection before and after use? | | ✔ | | | Discussion | |
| ; the fish tank interior disinfected using a solution of 00 ppm active chlorine for 30 minutes minimum or ɔrmaldehyde gas generation method (relative humidity f 60% for 2 hrs)? | | ✔ | | | Discussion | |
| Is the exterior of the fish transport vehicle disinfected using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes? | | | | ✔ | Discussion | Follow IHOT protocols for disinfection of exteriors and interiors of transport vehicles |
| ; the fish transport vehicle (cab) disinfected using 600 pm quaternary ammonia compounds (1.5 ml of 50% tock solution/liter water)? | | | | ✔ | Discussion | See above |
| ; other equipment disinfected including fish pumps, ets, egg sorters, waders, boots, rain gear, hoses and ther equipment using one of the following solutions? | | ✔ | | | Discussion | |
| 200 ppm chlorine for 30 minutes<br>600 ppm quaternary ammonia compound for 30 minutes<br>200 ppm iodophor solution for 10 minutes | | ✔ | | | Discussion | |
| )o personnel wear protective garments when handling sh eggs or cultural water? | | ✔ | | | Discussion | |
| )o the fish transport truck/chassis and tank/unit receive n inspection and service prior to the release season? | | ✔ | | | Discussion | |
| ; a daily service inspection completed before starting p and leaving for the day? | | ✔ | | | Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **nsportation facilities** | | | | | | |
| )oes the fish transport unit receive an inspection prior ) loading? | | ✔ | | | Discussion | |
| )oes a pre-loading inspection covering tank water evel, pumps or aerators, oxygen injection system ettings, displacement gauge, and truck loading/hauling ensity tables checked and reviewed occur prior to )ading fish in the transport unit? | | ✔ | | | Discussion | |
| )o hauling criteria include checking the fish 45 minutes ) 1 hour after loading? | | ✔ | | | Discussion | |
| Vhen fish are active and systems are functioning roperly, is the oxygen concentration reduced and ıaintained at approximately 8 ppm? | | | | ✔ | Discussion | Follow IHOT requirements for reduction of oxygen concentration to 8 ppm after system is functioning properly |
| ; water temperature in the transportation unit ıaintained within the 42-48 °F range? | | | | ✔ | Discussion | Follow IHOT temperature criteria for hauling |
| )o fish releasing procedures include the following riteria? | | | | | | |
| Releasing the fish at the correct release site or into the correct water body. | | ✔ | | | Discussion | |
| Tempering or the difference between the liberation tank and the target water body should not exceed 10°F. | | ✔ | | | Discussion | |
| The liberation hose should be angled so that fish gently hit the water. Using a tripod is a method of ensuring the hose will stay at the proper angle. | | ✔ | | | Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **luation practices** | | | | | | |
| las the hatchery conducted fishery contribution studies ): | | | | | | |
| Determine the requirements for evaluating and improving management programs? | | ✔ | | | Discussion | |
| Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit? | | ✔ | | | Discussion | |
| Develop guidelines that define if the proper stocks of fish are currently being used? | | ✔ | | | Discussion | |
| Determine which management units contribute to a specific fishery and the time periods of those contributions? | | ✔ | | | Discussion | |
| Determine the relative contributions of the various management units to a specific fishery over the different time periods? | | ✔ | | | Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **ining practices** | | | | | | |
| Does the hatchery have a training schedule for its staff? | | | | ✔ | Review of records/Discussion | Develop training schedule for staff |
| Does each staff member have a personal training plan approved by a supervisor and reviewed annually? | | ✔ | | | Review of records/Discussion | |
| Does the hatchery routinely exchange training details between other hatcheries and agencies? | | ✔ | | | Review of records/Discussion | |
| Does the hatchery encourage and reward off-duty training of staff? | | ✔ | | | Review of records/Discussion | |
| Does the hatchery conduct monthly staff meetings? | | ✔ | | | Review of records/Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **monthly hatchery monitoring visits being ducted by a qualified fish health specialist as cribed below?** | | | | | | |
| Conduct visit at least monthly | | ✔ | | | Review of records/Discussion | |
| Monitoring conducted by qualified fish health specialist | | ✔ | | | Review of records/Discussion | |
| Examine a representative sample of healthy and moribund fish from each lot. | | ✔ | | | Review of records/Discussion | |
| Review fish culture practices with hatchery manager. | | ✔ | | | Review of records/Discussion | |
| Report finding and results of necropsies on standard form. | | ✔ | | | Review of records/Discussion | |
| Recommend appropriate drug or chemical treatment. | | ✔ | | | Review of records/Discussion | |
| Summarize fish health status or stock prior to release or transfer to another facility. | | ✔ | | | Review of records/Discussion | |
| **all of the functions of the hatchery yearly nitoring visits being completed as described below?** | | | | | | |
| Annually examine each broodstock for the presence of reportable viral pathogens. | | ✔ | | | Review of records/Discussion | |
| Annually screen each salmon broodstock for the resence of *Renibacterium salmoninarum*. | | ✔ | | | Review of records/Discussion | |
| Conduct inspection by or under the supervision of ualified fish health specialist. | | ✔ | | | Review of records/Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **ıe hatchery following accepted sanitation cedures?** | | | | | | |
| ıre there any sources of pathogen-free water, especially or incubation and early rearing? | | ✔ | | | Discussion | |
| ıre the hatchery sanitation procedures understood and eing followed as described below? | | | | | | |
| Disinfect/water harden eggs in iodophor? | | ✔ | | | Inspection of facilities/Discussion | |
| Are foot baths containing disinfectant placed at the incubation facility's entrance and exit? | | ✔ | | | Inspection of facilities/Discussion | |
| Is equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery? | | ✔ | | | Inspection of facilities/Discussion | |
| Is equipment used to collect dead fish sanitized prior its use in another pond and/or lot of fish? | | ✔ | | | Inspection of facilities/Discussion | |
| Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location? | | ✔ | | | Inspection of facilities/Discussion | |
| Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock? | | ✔ | | | Inspection of facilities/Discussion | |
| Are dead fish properly disposed of? | | ✔ | | | Inspection of facilities/Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **water quality parameters being followed?** | | | | | | |
| re the following water quality parameters within riteria? (PM #5a-5g) | | | | | | |
| Water temperature | | | ✔ | | No data provided | See PM #5a |
| Dissolved gases | | | ✔ | | No data provided | See PM #5b |
| Chemistry | | | ✔ | | No data provided | See PM #5c |
| Turbidity | | | ✔ | | No data provided | See PM #5d |
| Alkalinity and hardness | | | ✔ | | No data provided | See PM #5e |
| Nitrite | | | ✔ | | No data provided | See PM #5f |
| Contaminants | | | ✔ | | No data provided | See PM #5g |
| o to PM #21 | | | | | | |
| **incubation and rearing standards being followed?** | | | | | | |
| Are the incubation practices following the IHOT incubation criteria? (PM #18) | | | | ✔ | Review of records/Discussion | See PM #18 |
| Are the rearing practices following the IHOT criteria? (PM #19) | | | | ✔ | Review of records/Discussion | See PM #19 |
| o to rearing practices PM #18-PM #19 | | | | | | |
| **egg and fish transfer/release requirements met?** | | ✔ | | | Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **ıe hatchery's program outlined in a subbasin ıagement plan?**<br><br>Go to subbasin plan PM #1 | | ✔ | | | Columbia Basin System Planning Production Plan and Wells Mitigation (FERC Agreement) | |
| **ıe hatchery operating under a current hatchery rational plan?**<br><br>Go to operational plan PM #2 | | ✔ | | | Review of IHOT Operations Plan | |
| **hatchery monitoring and evaluation plan in place?**<br><br>Go to hatchery monitoring and evaluation plan PM #3 | | | | ✔ | No information provided | Develop hatchery monitoring and evaluation plan for the IHOT Operations Plan |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **s the hatchery program meet requirements blished in the regional hatchery policies and basin planning documents in the following areas: cies, stock, broodstock collection location, odstock numbers, broodstock collection strategy, spawning and egg-take protocols?** | | | | | | |
| Does the hatchery program meet the requirements for he following? | | | | | | |
| Species protocols (PM #4a) | | ✔ | | | Review of records/Discussion | |
| Stock protocols (PM #4a) | | ✔ | | | Review of records/Discussion | |
| Broodstock collection location protocols (PM #41b) | | ✔ | | | Review of records/Discussion | |
| Broodstock numbers protocols (PM #42c) | | ✔ | | | Review of records/Discussion | |
| Broodstock collection strategy protocols (PM #41b-d) | | | | ✔ | Review of records/Discussion | See PM #41 |
| Spawning protocols (PM #42d-e) | | ✔ | | | Review of records/Discussion | |
| Egg-take protocols (PM #42f-g) | | ✔ | | | Review of records/Discussion | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **s the hatchery's performance meet requirements** | | | | | | |
| **ined in the regional hatchery policies and in basin and hatchery plans for the following areas: cent smoltification, rearing density, disease** | | | | | | |
| **dition, and the number, size date(s), and location of ase?** | | | | | | |
| ercent smoltification (PM #22a1) | | | | ✔ | Review of records/Discussion | See PM #22a1 |
| earing density (PM #22a2) | | ✔ | | | Review of records/Discussion | |
| )isease condition (PM #22a3) | | ✔ | | | Review of records/Discussion | |
| Jumber at release (PM #22a4) | | | | ✔ | Review of records/Discussion | See PM #22a4 |
| ize at release (PM #22a5) | | ✔ | | | Review of records/Discussion | |
| )ate of release (PM #22a6) | | ✔ | | | Review of records/Discussion | |
| ocation of release (PM #22a7) | | ✔ | | | Review of records/Discussion | |
| **fish reared in the subbasin or acclimated in the basin?** PM #22b | | | | ✔ | Discussion | See PM #22b |
| **ne release strategy appropriate for the program?** PM #22c | | | | ✔ | Discussion | See PM #22c |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **new programs, has a broodstock collection plan n developed?** | | | | | | |
| s the broodstock collection plan written? | ✔ | | | | Existing Program; does not apply | |
| or a non-captive broodstock program: | ✔ | | | | Existing Program; does not apply | |
| Was an unbiased, representative sample collected? | | | | | | |
| Was the recommended number of broodstock collected? | ✔ | | | | Existing Program; does not apply | |
| or a captive broodstock program: | | | | | | |
| Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program? | ✔ | | | | Existing Program; does not apply | |
| Were full-sib crosses avoided? | ✔ | | | | Existing Program; does not apply | |
| s the broodstock collection plan understood and being ollowed by staff? | ✔ | | | | Existing Program; does not apply | |
| **a new program, was the donor selection outline owed in selecting the hatchery broodstock?** | | | | | | |
| s a donor selection plan written? | ✔ | | | | Existing Program; does not apply | |
| Was the donor selection outline followed in selecting ne broodstock? | ✔ | | | | Existing Program; does not apply | |
| Was the target stock recommended in the donor election process actually used? | ✔ | | | | Existing Program; does not apply | |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **existing programs, were the broodstock collection cedures followed?** | | | | | | |
| s the broodstock collection plan written? | | ✔ | | | Review of broodstock collection plan | |
| Does the broodstock collection plan follow the uideline: | | | | | | |
| Was an unbiased, representative sample collected? | | ✔ | | | Discussion | |
| Was the recommended number of broodstock collected? | | ✔ | | | Discussion | |
| Were the broodstock collection procedures in hatchery operation plan understood and followed? | | | | ✔ | Discussion | Provide training on broodstock collection procedures |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **s the appropriate number of spawners, male/female os, and fertilization protocols used?** | | | | | | |
| ıre the spawning protocols written? | | ✔ | | | Review of spawning protocols | |
| ıre daily or weekly spawning logs available? | | | | ✔ | No information provided | Document daily or weekly spawning activities |
| Vas the appropriate number of spawners used? | | | ✔ | | Discussion | See above |
| )id you attempt to spawn all collected broodstock and ındomize mating with respect to age class, and other ·aits? | | ✔ | | | Discussion | |
| Vas the sex-ratio within the limits given in the erformance standards? | | ✔ | | | Discussion | |
| Vere the fertilization protocols followed? | | ✔ | | | Discussion | |
| : the hatchery needed to reduce the number of eggs etained, was this done by representative sampling of ach male/female cross? | | | ✔ | | Not typically needed. Retained eggs are from positive IPN isolation days. May need to review protocols. | Review protocols for representativeness of male/female crosses. |

| Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|
| | N/A | Yes | ? | No | | |
| **ıere a genetics monitoring and evaluation program lace?** | | | | | | |
| ; a genetics monitoring and evaluation program vailable? | | | | ✔ | No plan | Develop approved genetics M&E program |
| )oes the plan address the following elements listed in HOT: | | | | | | |
| Does the program have elements needed to meet evaluation goals 1-4? | | | | ✔ | Discussion | |
| Has a qualified geneticist reviewed and endorsed the program (goal 5)? | | | | ✔ | Discussion | |
| Will the program collect the data and maintain the records needed to evaluate compliance on an ongoing basis (goal 5)? | | | | ✔ | Discussion | |
| Is the program understood and followed by staff? | | | | ✔ | Discussion | |

Section 4

# Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The types of categories range across a spectrum from those actions that are beyond human control, to those that require a change in agency policy or procedures, to those that involve a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

**The Five Types of Remedial Actions**

| Type | Description |
|---|---|
| 1 | Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery |
| 2 | Remedial actions requiring changes in agency policies or procedures |
| 3 | Remedial actions requiring changes in monitoring coverage or interval |
| 4 | Remedial actions requiring significant capital expenditures |
| 5 | Remedial actions that may require significant capital expenditures but are not clearly definable at this time |

## Remedial Actions at Wells Hatchery - Summer Steelhead

This section presents the corrective actions required to bring the Wells Hatchery - Summer Steelhead program into compliance with IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 3).

The cost estimates presented in this section are based on professional experience from similar projects. In most cases, only a lump-sum figure is presented, and detailed take-off lists have not been prepared. The cost estimates are essentially order of magnitude estimates (± 40%).

More importantly, the suggested remedial activities may also present several levels of action. Optional actions have been listed for several problems. These optional actions are desirable for either operational or safety considerations.

## Table 3. Remedial Actions Required at Wells Hatchery - Summer Steelhead

| Remedial Action Required | Cost | PMs[1] |
|---|---|---|
| **Type 1** - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery | | |
| None | ---- | |
| **Type 2** - Remedial actions requiring changes in agency policies or procedures | | |
| Develop written monitoring and evaluation plan for the IHOT Operations Plan | ---- | 3 |
| Document adult contribution | ---- | 4a |
| Document eyed-egg to fry survival | ---- | 4e |
| Document fry-to-smolt survival | ---- | 4f |
| Document smolt production | ---- | 4g |
| Document smolt-to-adult survival | ---- | 4h |
| Review IHOT temperature criteria for rearing | ---- | 5a |
| Review IHOT requirement for disease-free water for rearing | ---- | 5h |
| Develop alarm log | ---- | 6 |
| Follow IHOT requirements for daily checking of water flow alarms and weekly checking of other alarms | ---- | 6 |
| Conduct IHOT QA/QC tests for feed preparation | ---- | 12 |
| Develop specific incubation, early rearing, and rearing standards for the IHOT Operations Plan | ---- | 18-19 |
| Follow IHOT incubator criteria for loading and flow | ---- | 18 |
| Develop smoltification goal and monitor | ---- | 22a1 |
| Follow IHOT protocols for disinfection of exteriors and interiors of transport vehicles | ---- | 23 |
| Follow IHOT requirements for reduction of oxygen concentrations to 8 ppm after system is functioning properly | ---- | 23 |

[1] PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

| Remedial Action Required | Cost | PMs[1] |
|---|---|---|
| **Type 2 (Continued)** - Remedial actions requiring changes in agency policies or procedures | | |
| Follow IHOT temperature criteria for hauling | ---- | 23 |
| Develop training schedule for staff | ---- | 25 |
| Provide training on broodstock collection procedures | ---- | 41 |
| Develop approved genetics M&E program | ---- | 43 |
| Document daily or weekly spawning activities | ---- | 42b, 42c |
| Review protocols for representatives of male/female crosses | ---- | 42g |
| **Type 3** - Remedial actions requiring changes in monitoring coverage or interval | | |
| Document DO and TGP levels | ---- | 5b |
| Document water chemistry parameters, turbidity, alkalinity, hardness, nitrite, and contaminants | ---- | 5c-5g |
| **Type 4** - Remedial actions requiring significant capital expenditures | | |
| Install auto dialer and pagers | $5,000 | 6 |
| Install intake screen that meets the current approach and mesh criteria | $2,000,000 | 10 |
| Install double screens on 2 ponds | $4,500 | 10 |
| Install predator control fencing around earthen ponds and evaluate | $41,250 | 11, 22a4 |
| Construct 3 acclimation facilities | $3,000,000 | 22b |
| **Type 5** - Remedial actions that may require significant capital expenditures but are not clearly definable at this time | | |
| Improve green-egg to eyed-egg survival | ---- | 4d |
| Construct new pipeline; analysis needed to determine extent of modifications | ---- | 19 |

[1] PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

Section 5

# Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Wells Hatchery - Summer Steelhead program contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2-, 3-, 4-, 5-, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4 to 5 years after the fish have been released from the hatchery.

**Table 4. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Wells Hatchery - Summer Steelhead**

| Year | Fisheries[1] (Broodyear) | Spawning Grounds[1] (Broodyear) | Hatchery[1] (Broodyear) | Total Combined Contribution[2] (Broodyear) | Smolt to Adult Survival (percent) |
|---|---|---|---|---|---|
| 1983 | | | | | |
| 1984 | | | | | |
| 1985 | | | | | |
| 1986 | | | | | |
| 1987 | No information provided | No information provided | No information provided | No information provided | No information provided |
| 1988 | No information provided | No information provided | No information provided | No information provided | No information provided |
| 1989 | No information provided | No information provided | No information provided | No information provided | No information provided |
| 1990 | | | | | |
| 1991 | | | | | |
| 1992 | | | | | |

[1] Data obtained from Missing Production Groups Annual Report or from the Regional Mark Information System database.

[2] Total combined adult contribution; presented when it is not possible to subdivide the contribution into fisheries, spawning grounds, and hatchery contributions.

Section 6

# Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program was estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 5 shows the annual operating expenses for the Wells Hatchery - Summer Steelhead program. For programs that occur at more than one facility (as shown on Table 1 in Section 3 of this report), the cost breakdown for the component(s) at each facility is presented in separate tables (Tables 5a, 5b, 5c, etc).

**Table 5. Annual Operating Expenses: Wells Hatchery - Summer Steelhead**

| Hatchery | 1993 | 1994 | 1995 |
|---|---|---|---|
| 1. Wells Hatchery | **$358,522** | **$345,185** | **$357,500** |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| **Total Program Costs** | **$358,522** | **$345,185** | **$357,500** |

The total expenditures for the Wells Hatchery are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery are presented in separate tables (Table 6a, 6b, 6c, etc).

**Table 6. Annual Operating Expenses - Wells Hatchery**

| Program | 1993 | 1994 | 1995 |
|---|---|---|---|
| 1. Summer Chinook | **$292,905** | **$282,424** | **$292,500** |
| 2. Summer Steelhead | **$358,522** | **$345,185** | **$357,500** |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| **Total Hatchery Costs** | **$651,858** | **$627,609** | **$650,000** |

## Table 5a. Annual Operating Expenses: Wells Hatchery - Summer Steelhead

### Expenditure Occurring at Wells Hatchery

| Component | 1994 | 1995 | 1996 |
|---|---|---|---|
| Personnel Costs | | | |
| Operational Costs | | | |
| Capital Costs | | | |
| Indirect Costs | | | |
| Lumped Hatchery Costs[1] | $651,858 | $627,609 | $650,000 |
| Lumped Third-Party Costs | | | |
| **Total Hatchery Costs** | **$651,858** | **$627,609** | **$650,000** |
| **Source of Funds** | | | |
| Douglas County PUD | **100%** | **100%** | **100%** |
| | | | |
| Program Production (lb) | 75,000 | 75,000 | 75,000 |
| Total Production (lb) | 136,200 | 136,200 | 136,200 |
| Program as Percent of Total | 55% | 55% | 55% |
| **Program Costs** | **$358,522** | **$345,185** | **$357,500** |

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

## Table 6a. Detailed Expenditures at Wells Hatchery by Program

### Summer Chinook

| Component | 1994 | 1995 | 1996 |
|---|---|---|---|
| Personnel Costs | | | |
| Operational Costs | | | |
| Capital Costs | | | |
| Indirect Costs | | | |
| Lumped Hatchery Costs[1] | $651,858 | $627,609 | $650,000 |
| Lumped Third-Party Costs | | | |
| **Total Hatchery Costs** | **$651,858** | **$627,609** | **$650,000** |
| **Source of Funds** | | | |
| Douglas County PUD | **100%** | **100%** | **100%** |
| | | | |
| Program Production (lb) | 61,200 | 61,200 | 61,200 |
| Total Production (lb) | 136,200 | 136,200 | 136,200 |
| Program as Percent of Total | 45% | 45% | 45% |
| **Program Costs** | **$292,905** | **$282,424** | **$292,500** |

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

## Table 6b. Detailed Expenditures at Wells Hatchery by Program

## Summer Steelhead

| Component | 1994 | 1995 | 1996 |
|---|---|---|---|
| Personnel Costs | | | |
| Operational Costs | | | |
| Capital Costs | | | |
| Indirect Costs | | | |
| Lumped Hatchery Costs[1] | $651,858 | $627,609 | $650,000 |
| Lumped Third-Party Costs | | | |
| **Total Hatchery Costs** | **$651,858** | **$627,609** | **$650,000** |
| **Source of Funds** | | | |
| Douglas County PUD | **100%** | **100%** | **100%** |
| | | | |
| Program Production (lb) | 75,000 | 75,000 | 75,000 |
| Total Production (lb) | 136,200 | 136,200 | 136,200 |
| Program as Percent of Total | 55% | 55% | 55% |
| **Program Costs** | **$358,522** | **$345,185** | **$357,500** |

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.